Space Weather Forecast

Issued on Monday, 27 November 2023 at 01:10 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Isolated Moderate flares/R1-R2 Radio Blackouts likely throughout. Chance of Minor Geomagnetic Storms Days 1-2 (25-26 Nov).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Low, with a peak Common-class flare from near the northern centre disc at 26/0744 UTC. There are currently eleven sunspot groups on the visible disc. Near centre disc in the northern hemisphere there is a cluster of three sunspot groups that appear to be contained within the same area of plage and magnetically connected. The largest group is a consists of two large unipolar spots, with opposite polarity trailing spots now faded. The other groups remain comparatively small and more magnetically simple.

The largest sunspot group currently on the disc is in the southeast. This compact region primarily consists of a large delta spot and other mature spots in close proximity.

The other groups on the disc have remained largely stable and are generally smaller or simpler than those mentioned above.

No Earth-directed Coronal Mass Ejections (CME) have been observed in the past 24hrs.

Solar Wind / Geomagnetic Activity: Solar wind parameters have largely been at elevated levels through the day but also on a gradual decline, initially around 550km/s but falling to around 500 km/s from around 2200 UTC. The Interplanetary Magnetic Field (IMF) has been weak and on a slow, steady decline. The important north-south component has been predominately northwards, but has varied weakly. The resultant geomagnetic activity was initially at Active levels (Kp4), before dropping quickly to unsettled (Kp3), then to quiet levels (Kp0-2) from 0900 UTC.

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate activity is expected with isolated Moderate class flares and a slight chance of a Strong flare. The main flare risk is from regions currently positioned on the eastern solar hemisphere and from the cluster close to centre disc in the north.

Solar Winds / Geomagnetic Activity: A Coronal Mass Ejection (CME) is in the forecast and is associated with the 24/0933 UTC M1.1 flare from AR3499 in the southwest quadrant of the disc. This is expected to miss below Earth's orbit with just a slight chance of a glancing blow around 1200 UTC during Day 1 (27 Nov), however there is some uncertainty regarding this CME.

Solar wind speeds have been largely at elevated levels through the day but also on a gradual decline, initially around 550km/s but falling to around 500 km/s from around 2200 UTC. This is consistent with a connection with a high speed stream (HSS) and may remain under its influence over Days 1-2 (27-28 Nov). Solar winds are therefore forecast to remain at, or close to, elevated levels at around 480-520 km/s through Day 1 and perhaps also into Day 2, before a steady decline back to ambient wind speeds. There does remain an element of uncertainty regarding

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the current positioning of the HSS, as well as any further CME enhancements over Days 1 as mentioned, which could see a temporary slight rise in solar winds speeds during Day 1.

Geomagnetic activity is currently at Quiet levels (Kp0-2) and is expected to remain mostly at quiet/unsettled levels (Kp0-3) over the next few days. During day 1 there is a chance of some Active periods (Kp4) and a slight chance of seeing G1/Minor storm intervals due to the uncertainty of the glancing blow from the CME combined with HSS effects.

Energetic Particles / Solar Radiation: No solar radiation storms are expected. However there are several complex regions just west of the centre of the disc. These result in a slightly above background risk of an S1/Minor Solar Radiation Storm in the coming days.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	20	10	1	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	50	50	60	60
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	15	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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